

CLAIMS

1. A capacitor unit comprising:
a plurality of capacitors;
5 a circuit board on which a circuit pattern for connecting the plurality of capacitors in series or in parallel is formed; and
a holder sandwiching and retaining body parts of the plurality of capacitors.
- 10 2. The capacitor unit according to claim 1,
wherein the plurality of capacitors have bipolar electrodes consisting of lead wires extending in the same direction;
wherein the holder has cylindrical housing portions for sandwiching and housing the body parts of the plurality of capacitors; and
15 wherein the circuit board is fixed to a plurality of height regulation bosses provided on the holder.
3. The capacitor unit according to claim 2, wherein the cylindrical housing portion has an inner diameter that is slightly larger than an outer diameter of
20 the capacitor and has, on an inner surface thereof, two or more ribs with which the capacitor is press-fitted and retained.
4. The capacitor unit according to claim 2, wherein the cylindrical housing portion has an inner diameter that is slightly larger than an outer diameter of
25 the capacitor and has, on an inner surface thereof, two or more elastic pieces consisting of a slit and a holding pawl with which the capacitor is retained.
5. The capacitor unit according to claim 2, wherein the holder retains the

capacitor by a force ranging from 0.1 kgf to 10 kgf in a direction in which the capacitor is pulled out.

6. The capacitor unit according to claim 2, wherein at least two of the
5 height regulation bosses have protrusions for positioning the circuit board, and the circuit board is provided with holes corresponding to the protrusions, each having a position-regulation function.

7. The capacitor unit according to claim 2, wherein at least two of the
10 height regulation bosses have screw holes for fixing the circuit board, and the circuit board is fixed with screws, thereby fixing the holder and the circuit board at a predetermined height.

8. The capacitor unit according to claim 2, wherein the height regulation
15 boss has a positioning protrusion and a screw hole concentrically, and a height of the positioning protrusion is lower than a thickness of the circuit board.

9. The capacitor unit according to claim 2, wherein the lead wires are bent
20 at an intermediate portion toward a soldering portion so that a length from an exit of the capacitor to a fixed portion of the circuit board becomes substantially longer.

10. The capacitor unit according to claim 1, wherein the holder is attached
25 to an attaching position inside a case via a plurality of attaching portions provided on an outer periphery of the holder; and predetermined space is retained between a bottom portion of the capacitor and a bottom portion of the case.

11. The capacitor unit according to claim 10, wherein the capacitor has an opening structure for releasing electrolyte on the bottom portion thereof.

12. The capacitor unit according to claim 11, wherein space between the
5 bottom portion of the capacitor and the bottom portion of the case is set to predetermined space capable of allowing the opening structure to operate.

13. The capacitor unit according to claim 11, wherein the case has barriers for preventing electrolyte from conducting between neighboring capacitors
10 when the opening structure operates and electrolyte leaks out.

14. The capacitor unit according to claim 11, wherein the case has barriers for preventing electrolyte from conducting between series connections having a potential difference when the opening structure operates and electrolyte leaks
15 out.

15. The capacitor unit according to claim 1, further comprising:
a capacitor block formed of the plurality of capacitors, the holder and the circuit board;
20 a control circuit portion on which a charge and discharge circuit for charging and discharging the capacitor block is formed; and
a connector for electrically connecting the capacitor block to the control circuit portion,
wherein the control circuit portion charges and discharges the capacitor
25 by a charging / discharging signal of external load.

16. The capacitor unit according to claim 15, wherein the control circuit portion comprises an input/output connector electrically linked to the external

load, and the input/output connection is housed in the case together with the capacitor block.

17. The capacitor unit according to claim 15, wherein the capacitor has
5 bipolar electrodes consisting of lead wires extending in the same direction.

18. The capacitor unit according to claim 15, wherein the holder has, on an upper surface of the holder, a plurality of height regulation bosses so that space between the upper surface of the capacitor and the circuit board is maintained
10 at a predetermined distance.

19. The capacitor unit according to claim 18, wherein at least two of the height regulation bosses have protrusions for positioning the circuit board, and the circuit board is provided with holes corresponding to the protrusions, each
15 having a position-regulation function.

20. The capacitor unit according to claim 18, wherein at least two of the height regulation bosses have screw holes for fixing the circuit board, and the circuit board is fixed with screws, thereby fixing the holder and the circuit
20 board at a predetermined height.

21. The capacitor unit according to claim 18, wherein the height regulation boss has a positioning protrusion and a screw hole concentrically, and a height of the positioning protrusion is lower than a thickness of the circuit board.
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22. The capacitor unit according to claim 17, wherein the lead wires are bent at an intermediate portion toward a soldering portion so that a length from an exit of the capacitor to a fixed portion of the circuit board becomes

substantially longer.

23. The capacitor unit according to claim 15, wherein the capacitor has an opening structure for releasing electrolyte on the bottom portion thereof.

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24. The capacitor unit according to claim 15, wherein the plurality of capacitors are disposed so that lead lands of neighboring capacitors on the circuit board are in the same potential.

10 25. The capacitor unit according to claim 15, wherein the circuit board has a resistor for balancing voltage corresponding to the number of series connections of the capacitors, which is mounted in parallel to the capacitor.

15 26. The capacitor unit according to claim 15, wherein the circuit board has a test point for monitoring at least voltage or property every parallel block of the capacitors.

20 27. The capacitor unit according to claim 15, wherein a control circuit portion has a function of monitoring at least voltage or property of the capacitor block.

25 28. The capacitor unit according to claim 15, wherein the holder comprises a cylindrical housing portion that sandwiches and houses body parts of the plurality of capacitors and fixes the capacitors so that the capacitors do not move due to external vibration factors.

29. The capacitor unit according to claim 28, wherein the cylindrical housing portion has an inner diameter that is slightly larger than an outer

diameter of the capacitor and has, on an inner surface thereof, two or more ribs with which the capacitor is press-fitted and retained.

30. The capacitor unit according to claim 28, wherein the cylindrical
5 housing portion has an inner diameter that is slightly larger than an outer diameter of the capacitor and has, on an inner surface thereof, two or more elastic pieces consisting of a slit and a holding pawl with which the capacitor is retained.

10 31. The capacitor unit according to claim 28, wherein the holder retains the capacitor by a force ranging from 0.1 kgf to 10 kgf in a direction in which the capacitor is pulled out.

15 32. The capacitor unit according to claim 16, wherein the capacitor block is attached to an attaching position inside the case via a plurality of attaching portions provided on the outer periphery of the holder; and predetermined space is retained between a bottom portion of the capacitor incorporated into the holder and a bottom portion of the case.

20 33. The capacitor unit according to claim 32, wherein space between the bottom portion of the capacitor and the bottom portion of the case is set to predetermined space capable of allowing the opening structure to operate.

25 34. The capacitor unit according to claim 16, wherein the case has, on a bottom portion of the case, barriers for preventing electrolyte from conducting between neighboring capacitors when the opening structure operates and electrolyte leaks out.

35. The capacitor unit according to claim 16, wherein the case has, on a bottom portion of the case, barriers for preventing electrolyte from conducting between series connections having a potential difference when the opening structure operates and electrolyte leaks out.

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36. The capacitor unit according to claim 16,
wherein the case comprises a lower case and an upper cover;
wherein the lower case has a regulation wall between the capacitor block and the control circuit portion;
10 wherein the capacitor block and the control circuit portion are electrically connected to each other via a relay connector; and
wherein the upper cover covers an entire portion.

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37. The capacitor unit according to claim 16, wherein the case has, on a side surface, a screw-fixing nut for fixing a bracket that is to be attached and a body to be fixed to each other.

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38. The capacitor unit according to claim 36, wherein the nut is press-fitted into a hole provided on a side surface of the case with a strength capable of enduring a torque necessary for screw-fixing.

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39. The capacitor unit according to claim 36, wherein the nut is formed by insert formation into a hole provided on a side surface of the case with a strength capable of enduring a torque necessary for screw-fixing.

40. The capacitor unit according to claim 36, wherein the case has, in a vicinity of the nut, a position regulating guide for attaching the bracket.

41. The capacitor unit according to claim 40, wherein the position-regulation guide is formed of a concave hole.

42. The capacitor unit according to claim 40, wherein the position-
5 regulation guide is formed of a convex boss.

43. The capacitor unit according to claim 36, wherein the lower case, the upper cover and the holder are formed of a glass-reinforced resin of grade in which warping is not likely to occur.

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44. The capacitor unit according to claim 36, wherein the lower case and the upper cover are fixed to a snap fit portion, which is configured by at least one or more pawl portions and rock portions formed by molding, by screw-fixing at least one or more portions.